

In the Claims

Claim 1 (Currently Amended): A distribution manifold for distributing gas and/or liquid phase substance from an inlet to multiple outlets with reduced variations in distribution comprising:

- a. a body;
- b. an inlet to the body;
- c. a plurality of outlets from the body;
- d. a member comprising an external rotatable fluid pathway including an entry end in fluid communication with the inlet of the body and an exit end in fluid communication with the plurality of outlets of the body, the member comprising a rotatable impeller which includes an intermediate portion which includes the fluid pathway, which is defined at least in part by surfaces of the impeller, the surfaces on the intermediate portion comprising a wall of an external supply groove, wherein the cross-sectional area of the supply groove is generally equal to the cross sectional area of the inlet of the body;
- e. a distribution void in fluid communication between the exit end of the fluid pathway and the plurality of outlets;
- f. so that the substance passes through and out the exit end of the fluid pathway and is distributed to the plurality of outlets through the distribution void.

Claim 2 (Original): The manifold of claim 1 wherein the substance comprises a fertilizer.

Claim 3 (Original): The manifold of claim 2 wherein the fertilizer comprises anhydrous ammonia.

Claims 4-5 (Cancelled).

Claim 6 (Currently amended): The manifold of claim 5-1 wherein the distribution void comprises an annular distribution groove between the exit of the supply groove and the plurality of outlets.

Claim 7 (Previously presented): The manifold of claim 1 wherein the impeller comprises a generally conical member having a tip end and a base end.

Claim 8 (Original): The manifold of claim 7 wherein the body includes a void between the inlet and plurality of outlets, the void having a conical portion generally matching the shape of the impeller.

Claim 9 (Original): The manifold of claim 8 wherein the body further comprises a cover removable over the void.

Claim 10 (Original): The manifold of claim 9 further comprising a sealing member between the cover and body.

Claim 11 (Original): The manifold of claim 9 wherein there is some longitudinal tolerance between the impeller and the body when the impeller is operatively positioned in the body.

Claim 12 (Cancelled).

Claim 13 (Currently amended): The manifold of claim ~~5~~1 wherein the cross sectional area of the inlet of the body is generally equal to the sum of cross-sectional areas of the plurality of outlets of the body.

Claim 14 (Original): The manifold of claim 6 comprising a generally constant cross sectional area along the supply groove, distribution groove, inlet, and the sum of outlets.

Claim 15 (Currently amended): The manifold of claim ~~5~~1 wherein the angle of the wall of the supply groove is generally selected to produce one-half of the pressure of the substance to push longitudinally or forward and one-half of the pressure to push sideways on the impeller.

Claim 16 (Original): The manifold of claim 1 wherein the fluid pathway comprises a spiral groove approximately three rotations on the impeller.

Claim 17 (Original): The manifold of claim 1 wherein the fluid pathway comprises a plurality of spiral grooves each having entrances in fluid communication with the inlet to the body and exits in fluid communication with the distribution void.

Claim 18 (Previously presented): The manifold of claim 1 further comprising a bearing associated with the member to facilitate rotation of the member in the body in response to fluid pressure on the member.

Claim 19 (Original): The manifold of claim 18 wherein the bearing comprises an axle having a bearing surface at a distal end extended inwardly of the body.

Claim 20 (Previously presented): The manifold of claim 1 wherein the plurality of outlets are radially disposed and spaced apart around the body.

Claim 21 (Previously presented): The manifold of claim 20 further comprising a connector mounted in fluid communication with each of the plurality of outlets in the body, the connectors adapted for connection to fluid conduits.

Claim 22 (Original): The manifold of claim 21 wherein the connectors are adapted for connection to fluid conduits terminating in injection knives.

Claim 23 (Original): The manifold of claim 1 wherein the inlet of the body includes a connector adapted for connection to a source of the substance.

Claim 24 (Original): The manifold of claim 23 wherein the connector is in fluid communication with a tank of substance.

Claim 25 (Previously presented): The manifold of claim 1 further comprising an actuator operatively connected to the member to rotate the member in the body.

Claim 26 (Original): The manifold of claim 25 wherein the actuator is a motor.

Claim 27 (Previously presented): The manifold of claim 1 further comprising a sensor operatively positioned to derive speed of rotation of the member.

Claim 28 (Original): The manifold of claim 1 in combination with an implement to carry a plurality of injection knives.

Claim 29 (Original): The manifold of claim 28 further in combination with an automotive vehicle.

Claim 30 (Original): The manifold of claim 29 further in combination with a tank of anhydrous ammonia.

Claims 31-42 (Cancelled).

Claim 43 (Currently amended): An apparatus for distributing a gas and/or liquid phase substance from an inlet to multiple outlets comprising:
a housing comprising an inlet, a plurality of outlets, a chamber between the inlet and the plurality of outlets;
a rotatable member positioned in the chamber, the rotatable member defining an external substance path in fluid communication with the inlet and a space in fluid communication with the plurality of outlets;
a generally constant cross sectional area along the substance path, the space, the inlet, and the sum of the outlets;
so that rotation of the rotatable member rotates the substance path and distributes substance from the inlet to the space in fluid communication with the outlets.

Claim 44 (Original): The apparatus of claim 43 wherein the rotatable member is a conical piece including at least one spiral groove from an entry at or near its tip to an exit at or near the base, and a bearing to facilitate rotation of the conical piece in the housing.

Claim 45 (Cancelled).

Claim 46 (Previously presented): The apparatus of claim 43 comprising multiple substance paths.

Claim 47 (Previously presented): The apparatus of claim 46 wherein the multiple substance paths each have an outlet in fluid communication with said space which is in fluid communication with the plurality of outlets in the housing.

Claim 48 (Previously presented): The apparatus of claim 46 wherein the multiple substance paths comprise three spiral grooves.

Claim 49 (Previously presented): The apparatus of claim 48 wherein the three spiral grooves each have an outlet which terminates in fluid communication with the space which is in fluid communication with the plurality of outlets in the housing, each spiral groove outlet spaced approximately 120 degrees from the next.

Claim 50 (Currently amended): A distribution manifold for distributing gas and/or liquid phase substance from an inlet to multiple outlets with reduced variations in distribution comprising:

- a. a body;
- b. an inlet to the body;
- c. a plurality of outlets from the body;
- d. a member comprising a rotatable fluid pathway including an entry end in fluid communication with the inlet of the body and an exit end in fluid communication with the

- plurality of outlets of the body, wherein the member comprises a rotatable impeller which includes an intermediate portion which includes the fluid pathway, which is defined at least in part by surfaces of the impeller, ~~wherein and the surfaces on the intermediate portion comprise a wall of an external supply groove having the entry end in fluid communication with the inlet of the body and the exit end in fluid communication with the plurality of outlets of the body, wherein the distribution void comprises an annular distribution groove between the exit of the supply groove and the plurality of outlets;~~
- e. a distribution void in fluid communication between the exit end of the fluid pathway and the plurality of outlets, the distribution void comprising an annular distribution groove between the exit of the supply groove and the plurality of outlets;
- hf. so that the substance passes through and out the exit end of the fluid pathway and is distributed to the plurality of outlets through the distribution void.

Claim 51 (Previously presented): The distribution manifold of claim 50 comprising a generally constant cross sectional area along the fluid pathway, the distribution void, the inlet, and the sum of the outlets.

Claim 52 (Previously presented): The distribution manifold of claim 50 comprising multiple fluid pathways.

Claim 53 (Currently amended): The distribution manifold of claim 52 wherein the multiple fluid pathways each have an outlet in fluid communication with said ~~space~~ distribution void which is in fluid communication with the plurality of outlets in the housing.

Claim 54 (Previously presented): A distribution manifold for distributing gas and/or liquid phase substance from an inlet to multiple outlets with reduced variations in distribution comprising:

- a. a body;
- b. an inlet to the body;
- c. a plurality of outlets from the body;

- d. a member comprising a rotatable fluid pathway including an entry end in fluid communication with the inlet of the body and an exit end in fluid communication with the plurality of outlets of the body, wherein the member comprises a rotatable impeller which includes an intermediate portion which includes the fluid pathway, which is defined at least in part by surfaces of the impeller, wherein the impeller comprises a generally conical member having a tip end and a base end;
- e. a distribution void in fluid communication between the exit end of the fluid pathway and the plurality of outlets;
- f. so that the substance passes through and out the exit end of the fluid pathway and is distributed to the plurality of outlets through the distribution void.

Claim 55 (Previously presented): The manifold of claim 54 wherein the body includes a void between the inlet and plurality of outlets, the void having a conical portion generally matching the shape of the impeller.

Claim 56 (Previously presented): The manifold of claim 55 wherein the body further comprises a cover removable over the void.

Claim 57 (Previously presented): The manifold of claim 56 further comprising a sealing member between the cover and body.

Claim 58 (Previously presented): The manifold of claim 56 wherein there is some longitudinal tolerance between the impeller and the body when the impeller is operatively positioned in the body.

Claim 59 (Previously presented): The distribution manifold of claim 54 comprising a generally constant cross sectional area along the fluid pathway, the distribution void, the inlet, and the sum of the outlets.

Claim 60 (Previously presented): The distribution manifold of claim 54 comprising multiple fluid pathways.

Claim 61 (Currently amended): The distribution manifold of claim 60 wherein the multiple fluid pathways each have an outlet in fluid communication with said ~~space~~ distribution void which is in fluid communication with the plurality of outlets in the housing.

Claims 62-64 (Canceled)

Claim 65 (Previously presented): An apparatus for distributing a gas and/or liquid phase substance from an inlet to multiple outlets comprising:
a housing comprising an inlet, a plurality of outlets, a chamber between the inlet and the plurality of outlets;
a rotatable member positioned in the chamber, the rotatable member defining an external substance path in fluid communication with the inlet and a space in fluid communication with the plurality of outlets;
wherein the rotatable member is a conical piece including at least one spiral groove from an entry at or near its tip to an exit at or near the base, and a bearing to facilitate rotation of the conical piece in the housing;
so that rotation of the rotatable member rotates the substance path and distributes substance from the inlet to the space in fluid communication with the outlets.

Claim 66 (Previously presented): The apparatus of claim 65 comprising a generally constant cross sectional area along the substance path, the space, the inlet, and the sum of the outlets.

Claim 67 (Previously presented): The apparatus of claim 65 comprising multiple substance paths.

Claim 68 (Previously presented): The apparatus of claim 67 wherein the multiple substance paths each have an outlet in fluid communication with said space which is in fluid communication with the plurality of outlets in the housing.

Claim 69 (Presently amended): A distribution manifold for distributing gas and/or liquid phase substance from an inlet to multiple outlets with reduced variations in distribution comprising:

- a. a body;
- b. an inlet to the body;
- c. a plurality of outlets from the body;
- d. a member comprising a rotatable fluid pathway including an entry end in fluid communication with the inlet of the body and an exit end in fluid communication with the plurality of outlets of the body, ~~a distribution void in fluid communication between the exit end of the fluid pathway and the plurality of outlets~~ the fluid pathway comprising a spiral groove approximately three rotations on the impeller, wherein the member comprises a rotatable impeller which includes an intermediate portion which includes the fluid pathway, which is defined at least in part by surfaces of the impeller;
- e. ~~wherein the fluid pathway comprises a spiral groove approximately three rotations on the impeller~~ a distribution void in fluid communication between the exit end of the fluid pathway and the plurality of outlets;
- f. so that the substance passes through and out the exit end of the fluid pathway and is distributed to the plurality of outlets through the distribution void.

Claim 70 (Previously presented): The distribution manifold of claim 69 comprising a generally constant cross sectional area along the fluid pathway, the distribution void, the inlet, and the sum of the outlets.

Claim 71 (Previously presented): The distribution manifold of claim 69 comprising multiple fluid pathways.

Claim 72 (Currently amended): The distribution manifold of claim 71 wherein the multiple fluid pathways each have an outlet in fluid communication with said ~~space~~distribution void which is in fluid communication with the plurality of outlets in the housing.

Claim 73 (Currently amended): A distribution manifold for distributing gas and/or liquid phase substance from an inlet to multiple outlets with reduced variations in distribution comprising:

- a. a body;
- b. an inlet to the body;
- c. a plurality of outlets from the body;
- d. a member comprising a rotatable fluid pathway including an entry end in fluid communication with the inlet of the body and an exit end in fluid communication with the plurality of outlets of the body, wherein the member comprises a rotatable impeller which includes an intermediate portion which includes the fluid pathway, which is defined at least in part by surfaces of the impeller; ~~wherein~~ the surfaces on the intermediate portion comprise a wall of an external supply groove having the entry end in fluid communication with the inlet of the body and the exit end in fluid communication with the plurality of outlets of the body; and the cross-sectional area of the inlet of the body is generally equal to the sum of the cross-sectional areas of the plurality of outlets of the body;
- e. a distribution void in fluid communication between the exit end of the fluid pathway and the plurality of outlets;
- f. so that the substance passes through and out the exit end of the fluid pathway and is distributed to the plurality of outlets through the distribution void.

Claim 74 (Previously presented): The distribution manifold of claim 73 comprising a generally constant cross sectional area along the fluid pathway, the distribution void, the inlet, and the sum of the outlets.

Claim 75 (Previously presented): The distribution manifold of claim 73 comprising multiple fluid pathways.

Claim 76 (Currently amended): The distribution manifold of claim 75 wherein the multiple fluid pathways each have an outlet in fluid communication with said ~~space~~ distribution void which is in fluid communication with the plurality of outlets in the housing.

Claim 77 (Previously presented): A distribution manifold for distributing gas and/or liquid phase substance from an inlet to multiple outlets with reduced variations in distribution comprising:

- a. a body;
- b. an inlet to the body;
- c. a plurality of outlets from the body;
- d. a member comprising a rotatable fluid pathway including an entry end in fluid communication with the inlet of the body and an exit end in fluid communication with the plurality of outlets of the body, wherein the member comprises a rotatable impeller which includes an intermediate portion which includes the fluid pathway, which is defined at least in part by surfaces of the impeller; ~~wherein~~ and the surfaces on the intermediate portion comprise a wall of an external supply groove having the entry end in fluid communication with the inlet of the body and the exit end in fluid communication with the plurality of outlets of the body;
- e. a distribution void in fluid communication between the exit end of the fluid pathway and the plurality of outlets, wherein the distribution void comprises an annular distribution groove between the exit of the supply groove and the plurality of outlets;
- f. wherein there is a generally constant cross-sectional area along the supply groove, the distribution groove, the inlet, and the sum of the outlets;
- g. so that the substance passes through and out the exit end of the fluid pathway and is distributed to the plurality of outlets through the distribution void.

Claim 78 (Cancelled).

Claim 79 (Previously presented): The distribution manifold of claim 77 comprising multiple fluid pathways.

Claim 80 (Currently amended): The distribution manifold of claim 79 wherein the multiple fluid pathways each have an outlet in fluid communication with said ~~space~~distribution void which is in fluid communication with the plurality of outlets in the housing.